

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
31 March 2005 (31.03.2005)

PCT

(10) International Publication Number
WO 2005/029598 A1

(51) International Patent Classification⁷: **H01L 33/00** Soichiro [JP/JP]; c/o SHOWA DENKO HD K.K., 5-1, Yawata Kaigan dori, Ichihara-shi, Chiba, 2900067 (JP).

(21) International Application Number:
PCT/JP2004/014128

(74) Agents: AOKI, Atsushi et al.; A. AOKI, ISHIDA & ASSOCIATES, Toranomon 37 Mori Bldg., 5-1, Toranomon 3-chome, Minato-ku, Tokyo, 1058423 (JP).

(22) International Filing Date:
21 September 2004 (21.09.2004)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(26) Publication Language: English

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

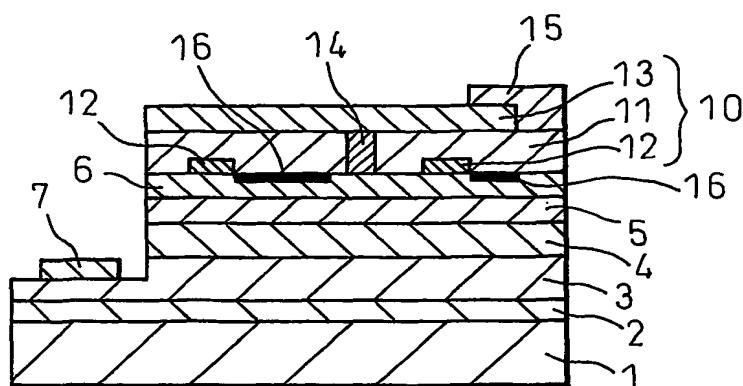
(30) Priority Data:
2003-330422 22 September 2003 (22.09.2003) JP
60/507,125 1 October 2003 (01.10.2003) US

(71) Applicant (for all designated States except US): SHOWA DENKO K.K. [JP/JP]; 13-9, Shibadaimon 1-chome, Minato-ku, Tokyo, 1058518 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): TOMOZAWA, Hideki [JP/JP]; c/o SHOWA DENKO K.K., 1-1, Ohnodai 1-chome, Midori-ku, Chiba-shi, Chiba, 2670056 (JP). OKUYAMA, Mineo [JP/JP]; c/o SHOWA DENKO K.K., 1-1, Ohnodai 1-chome, Midori-ku, Chiba-shi, Chiba, 2670056 (JP). MURAKI, Noritaka [JP/JP]; c/o SHOWA DENKO K.K., 1-1, Ohnodai 1-chome, Midori-ku, Chiba-shi, Chiba, 2670056 (JP). MASUYAMA,

(54) Title: GALLIUM NITRIDE-BASED COMPOUND SEMICONDUCTOR LIGHT-EMITTING DEVICE AND ELECTRODE FOR THE SAME



WO 2005/029598 A1

layer comprises an oxide of at least one metal selected from a second group consisting of Ni, Ti, Sn, Cr, Co, Zn, Cu, Mg, and In.

(57) Abstract: An object of the present invention is to provide a light-permeable electrode for use in a gallium nitride-based compound semiconductor light-emitting device, the electrode having improved light permeability and contact resistance. The inventive electrode comprises a light-permeable first layer which is in contact with a surface of a p-contact layer in a gallium nitride-based compound semiconductor light-emitting device and which is capable of providing ohmic contact, and a second layer which is in contact with a part of a surface of said p-contact layer, wherein the first layer comprises a metal, or an alloy of two or more metals, selected from a first group consisting of Au, Pt, Pd, Ni, Co, and Rh, and the second